

# A3 Altitude Test Facility SSC Industry Day September 2, 2009



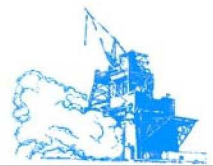
Lonnie Dutreix A3 Project Manager  
Robert Ross A3 Deputy Project Manager



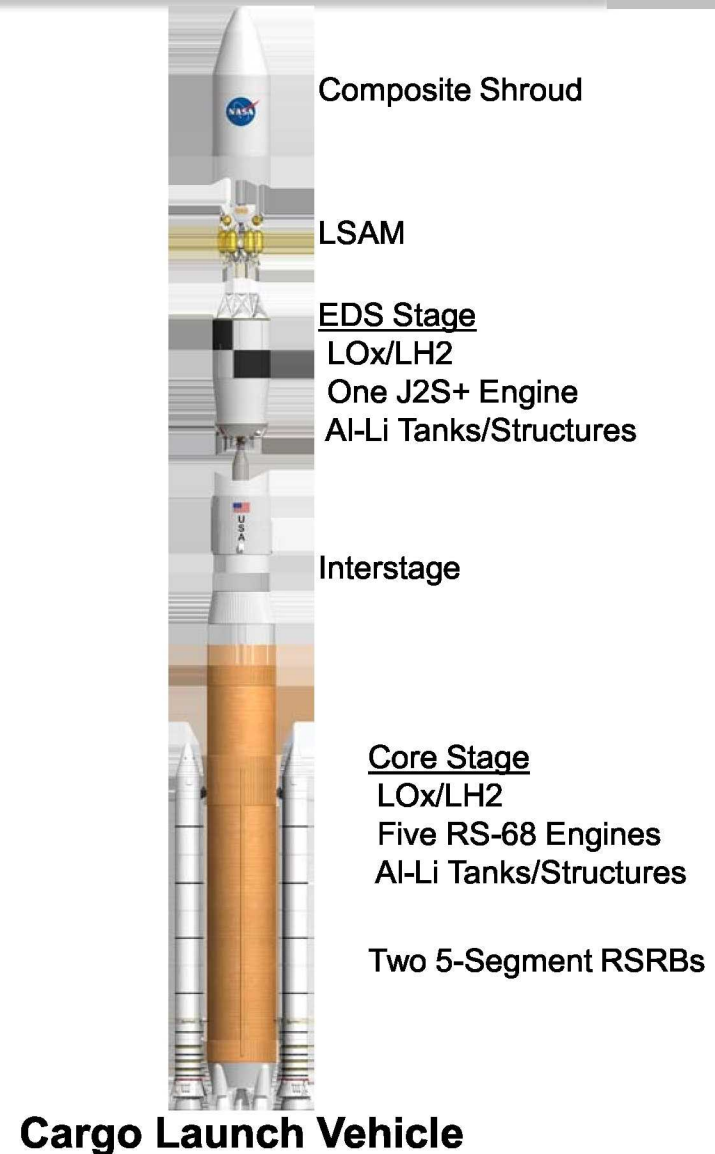
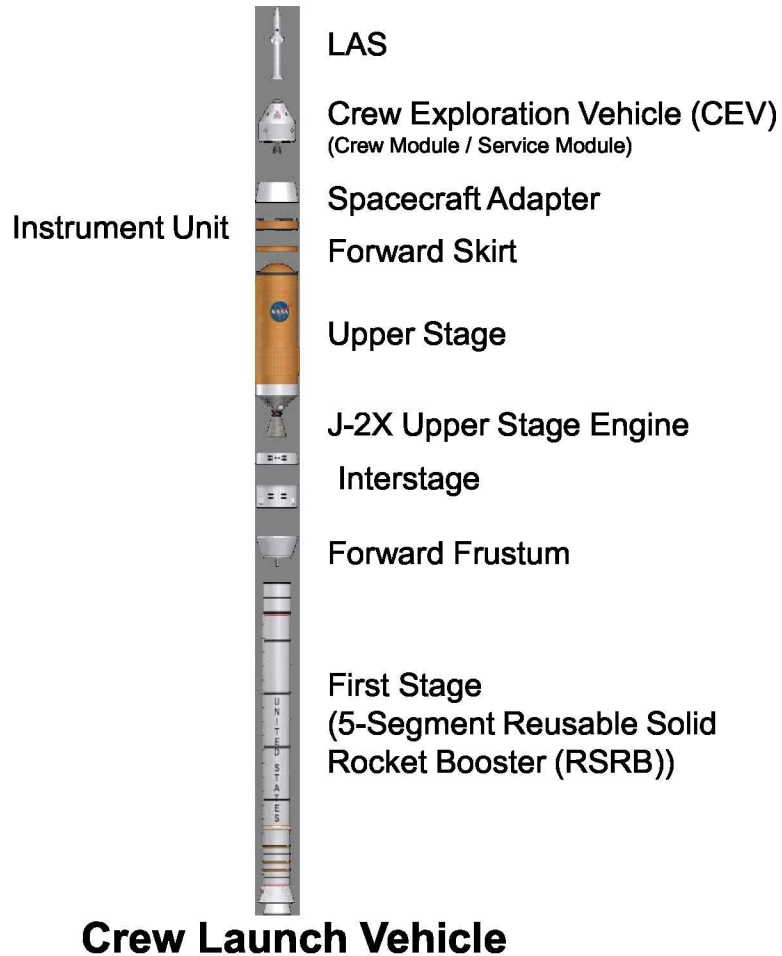




# Constellation Launch Vehicle Elements



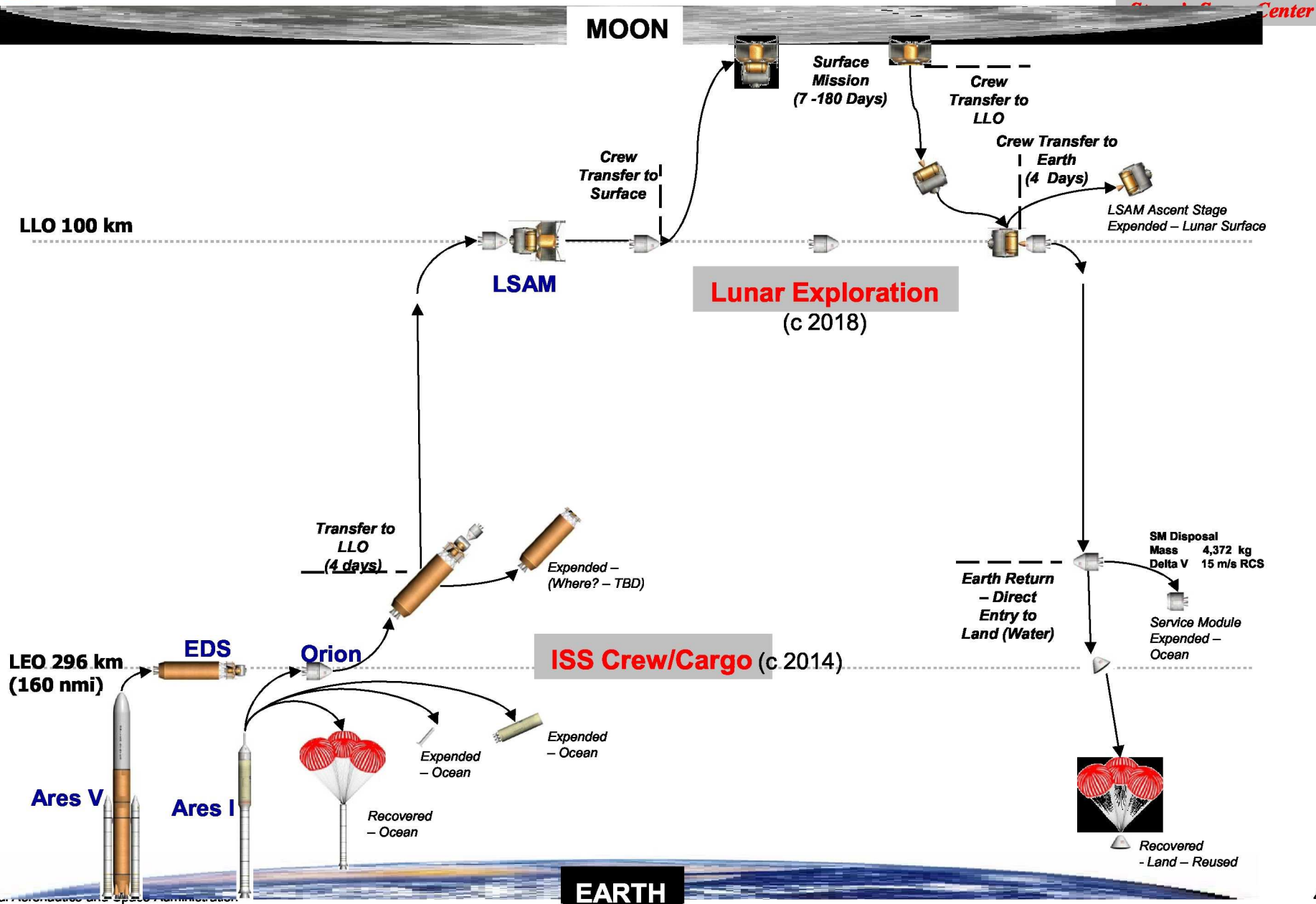
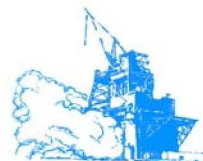
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# CxP ISS and Lunar Reference Mission



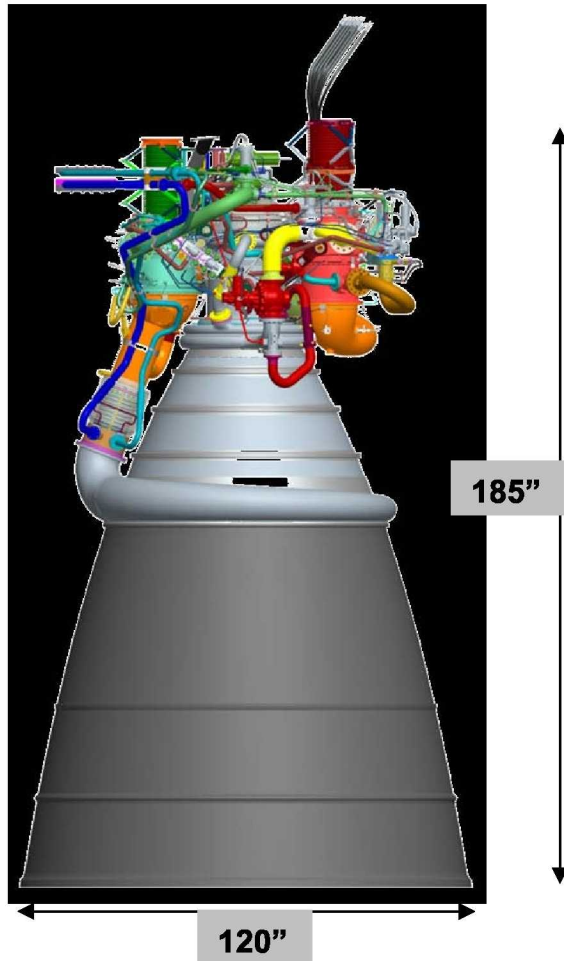


# Propulsion Test Facility Trades for J-2X Altitude Testing

## *Altitude Test Facility Requirements*



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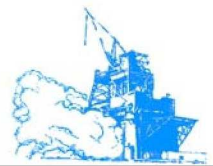
### ◆ A3 Facility Requirements

- **Start/Run Pressure: 0.16-0.4 psia (100-80 Kft)**
- **Run Duration: 550 sec**
- **Gimbal Angle: 5° (square pattern)**
- **Maximum Thrust Load: 1.0 Mlbf (vertical)**
- **Provide maximum flexibility for future test configurations**
  - Sea-level testing
  - Stage testing
- **Utilize existing propulsion test infrastructure, including cryogenics, barges, high pressure water, high pressure gas, engine assembly and warehousing facilities, skilled workforce, etc.**



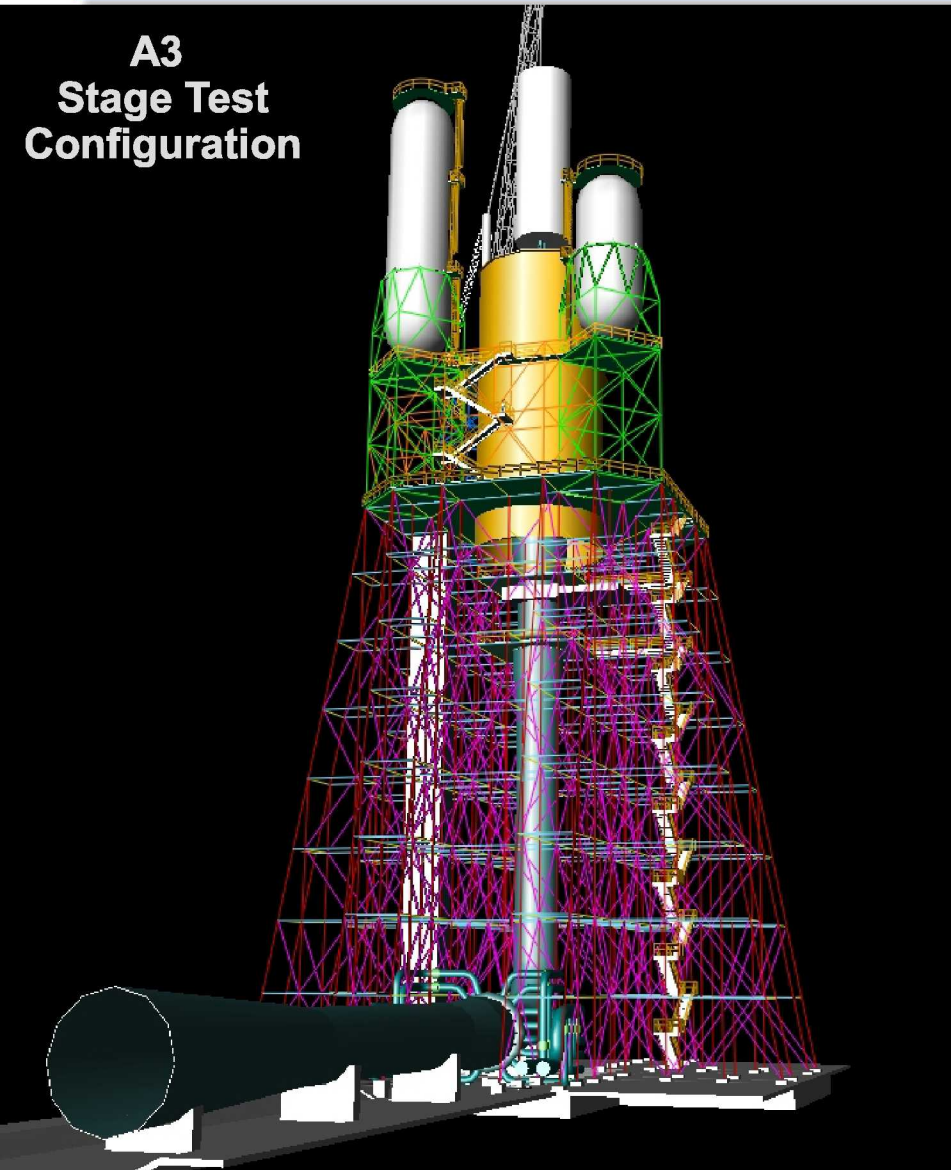
# A-3 Altitude Test Facility

## Meeting J-2X Project Requirements



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### A3 Stage Test Configuration



#### • Design

- Simplicity of “open diffuser” eliminates need for complex spray condensing chamber, dewatering & exhaust systems
- Design maximizes use of commercially available industrial components
- Key design elements based on established traditional rocket diffuser and chemical steam generator concepts supported by extensive operational data (40+ years)
- Early design risk mitigation thru testing of subscale diffuser and chemical steam generators at SSC

#### • SSC Location Benefits

- Experienced test crews available
- Enables workforce flexing across test stands
- Enables efficient utilization of SSC’s extensive propulsion test infrastructure
- Collocation of J-2X test facilities with engine assembly, integration and warehousing facility reduces logistics costs

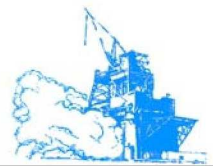
**A3 gives NASA at least one new large sea level & altitude capable test stand for the next 40 years**





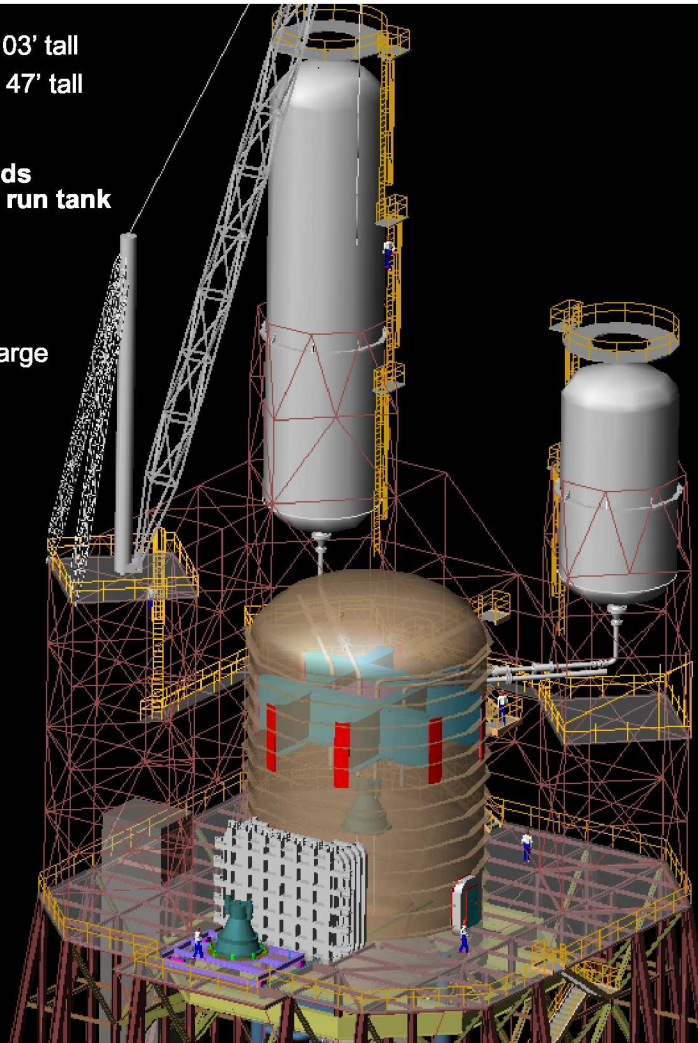
# A3 Test Stand 3-D Layout

## Test Cell and Thrust Takeout



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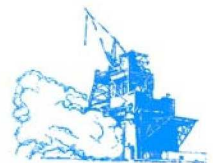
- ◆ 80,000 gallon LH tank, 13' O.D., 103' tall
- ◆ 35,000 gallon LOX tank: 13' O.D., 47' tall
- ◆ Volume includes:
  - 10% ullage
  - Test duration: 600 seconds
  - 10% remaining in heel of run tank
- ◆ Volume not included:
  - Chill down of run line
  - Fill run line
  - Chill test article
- ◆ Tank will be topped off from the barge after chilling and filling



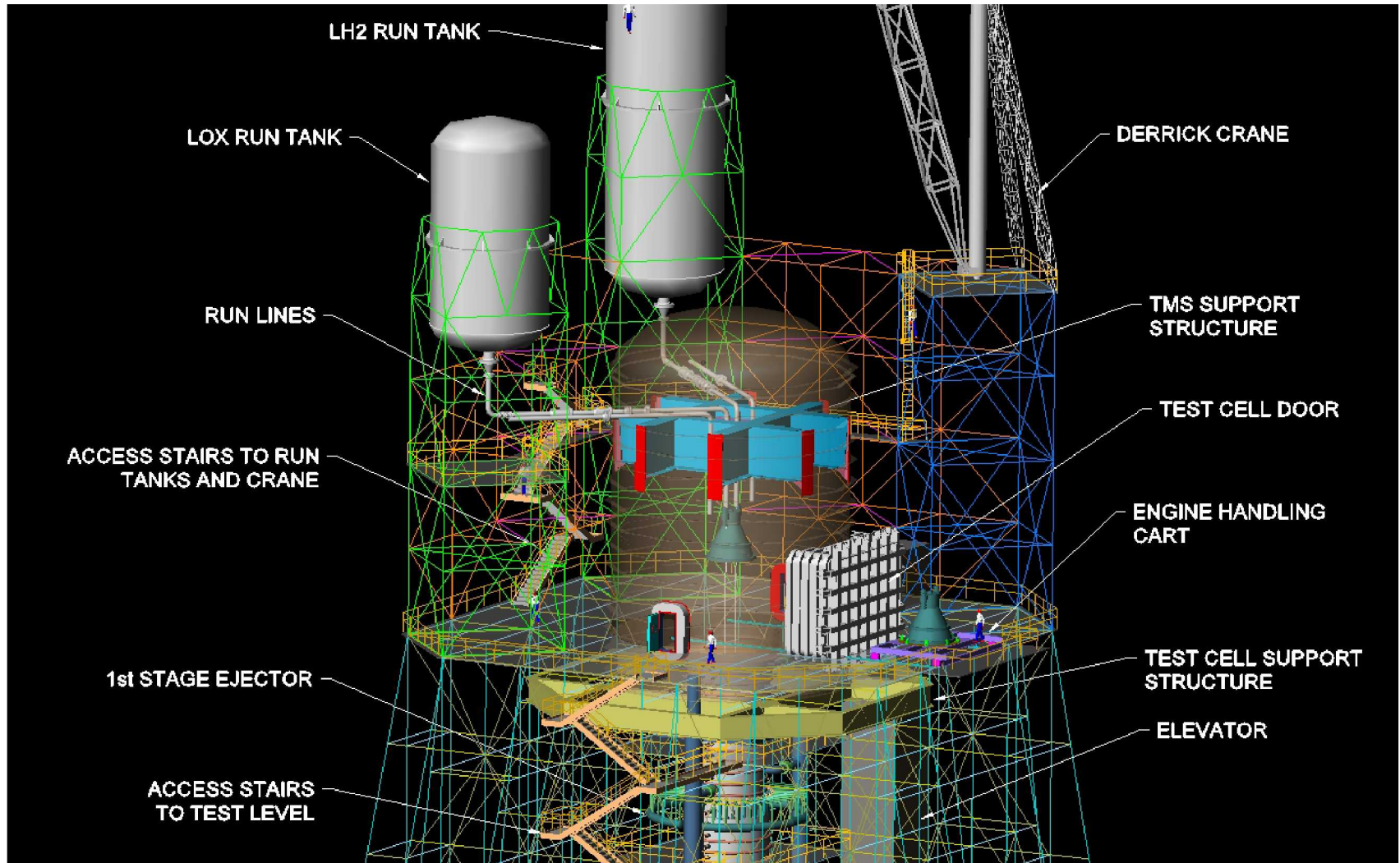


# A3 Test Stand 3-D Layout

## Engine Deck and Superstructure



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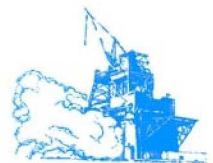




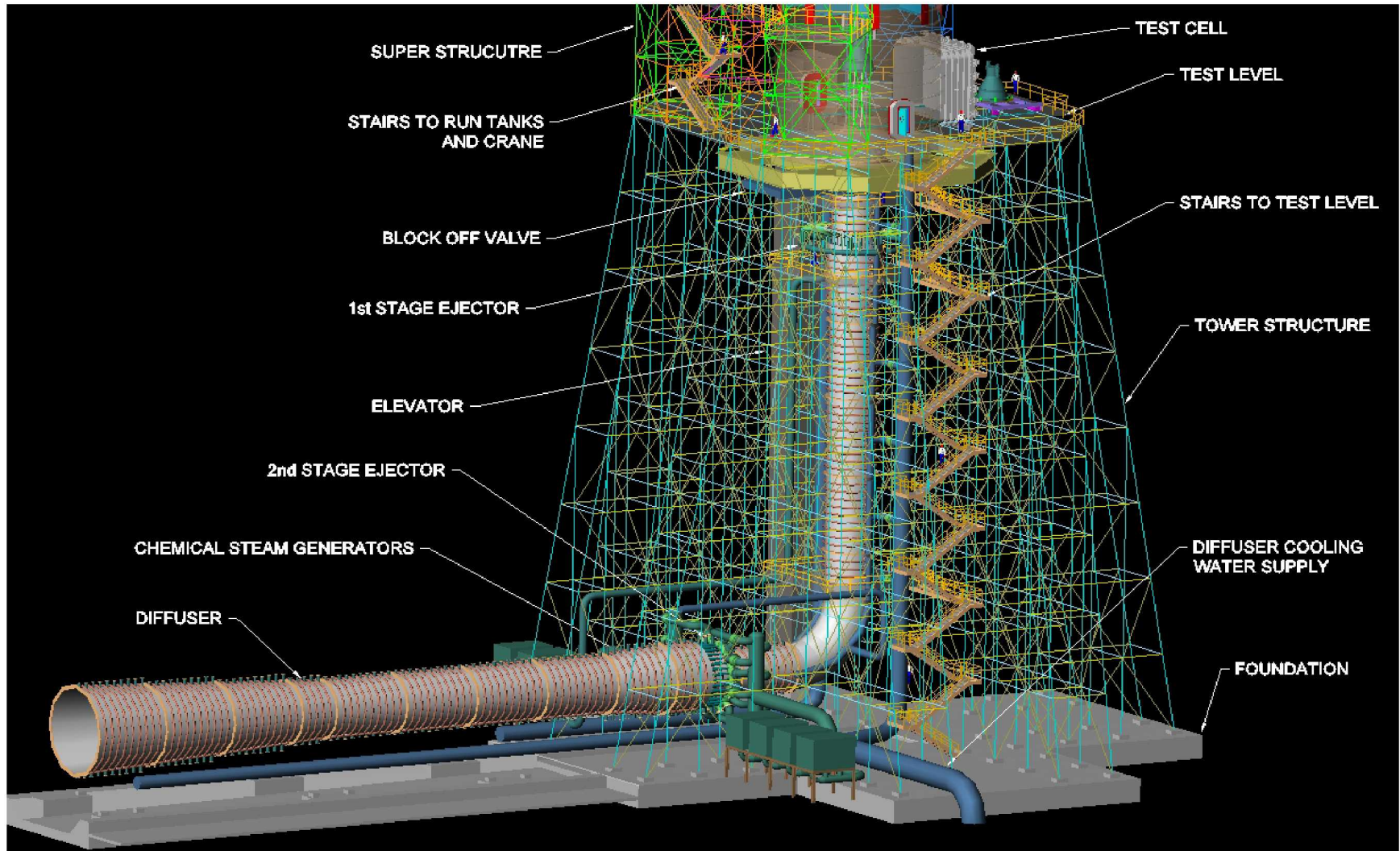


# A3 Test Stand 3-D Layout

## Structure and Altitude Support Systems

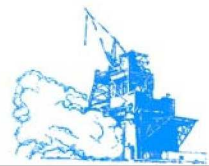


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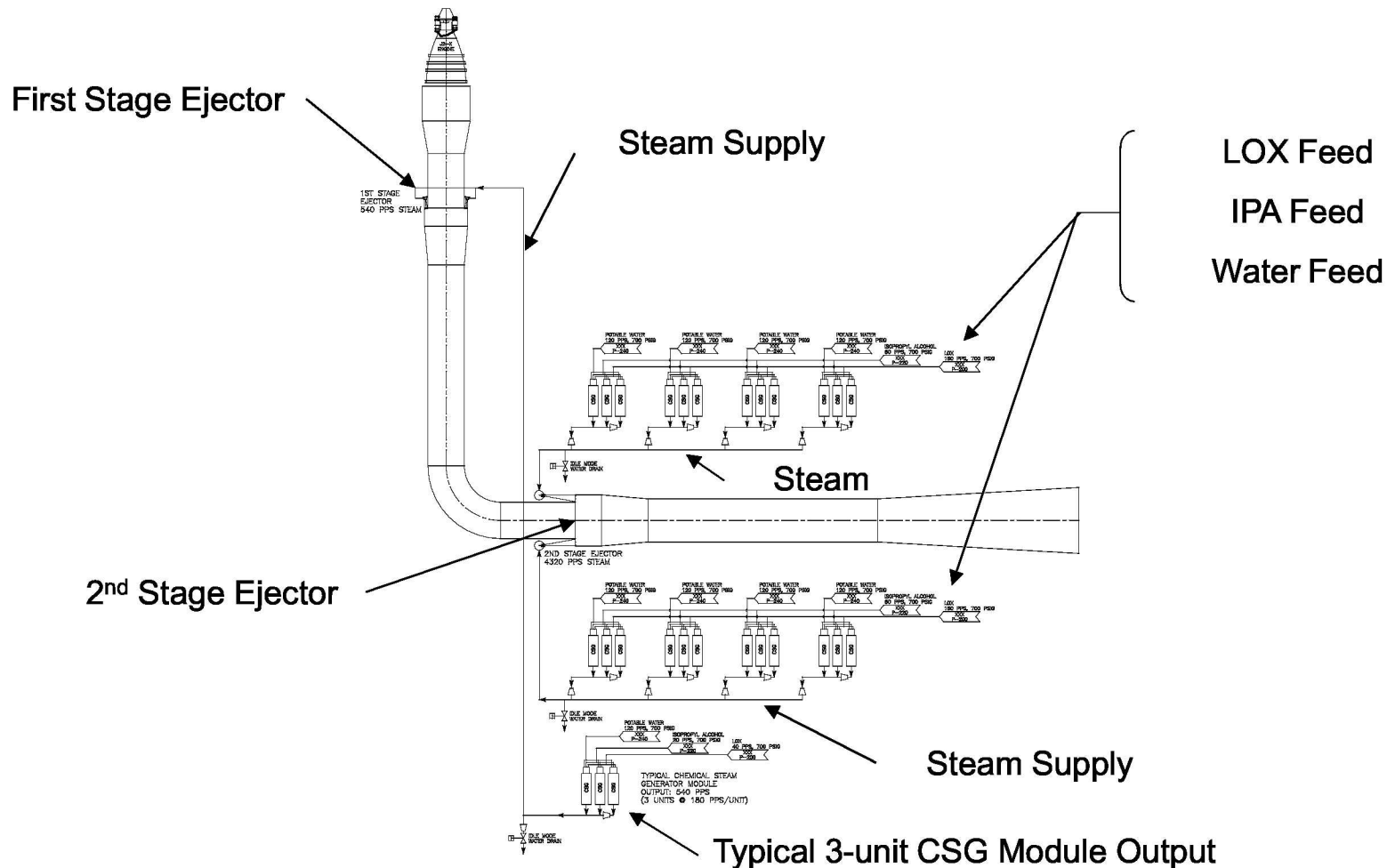


# Steam System



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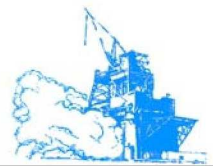
## ◆ A3 Steam System Schematic Diagram



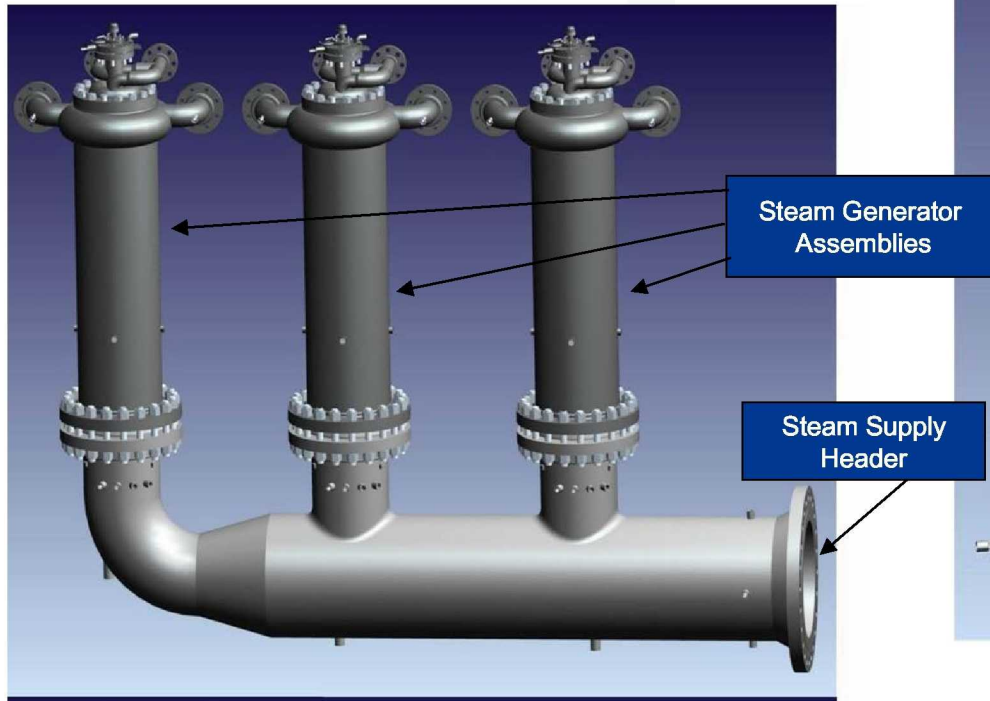
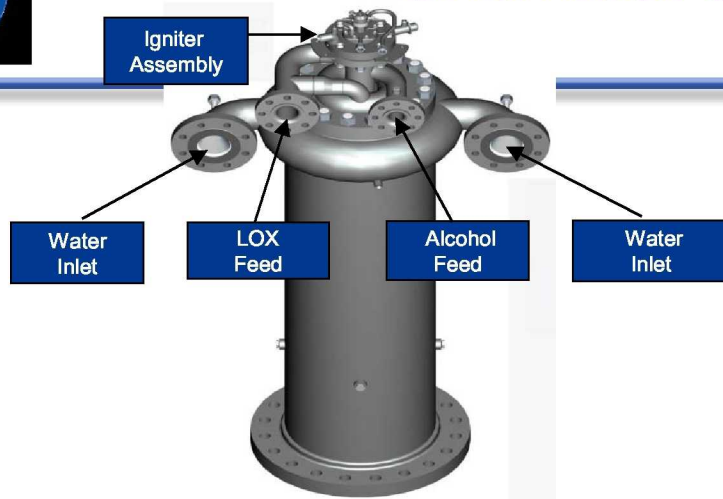




# Chemical Steam Generators

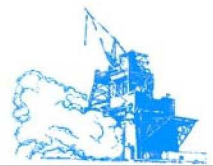


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# Chemical Steam Generators



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- ◆ **CSG cans for facility operation risk mitigate testing have been fabricated and tested**

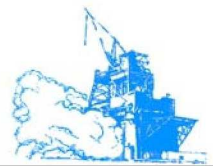


**Development CSG Can**





# Subscale Diffuser



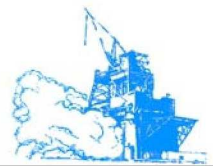
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# Stennis A3 Site Location



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# A3 Construction Site



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# A3 Construction Site



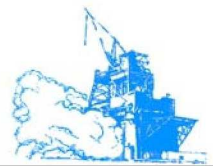
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